

Bent Grass Meadows Drive & Meridian Road
Bent Grass East Commercial
Transportation Memorandum
(LSC #184910)
March 21, 2019

Traffic Engineer's Statement

This traffic report and supporting information were prepared under my responsible charge and they comport with the standard of care. So far as is consistent with the standard of care, said report was prepared in general conformance with the criteria established by the County for traffic reports.



1

Engineering Review

01/16/2020 10:45:20 AM

dsdrice

JeffRice@elpasoco.com

(719) 520-7877

EPC Planning & Community
Development Department

Developer's Statement

I, the Developer, have read and will comply with all commitments made on my behalf within this report.

Bent Grass Metro District

Randle W. Case II, President

4/2/19
Date

Summary of Comments on Microsoft Word - Bent Grass Update

Page: 1

 Number: 1 Author: dsdrice Subject: EPC ENG Approval Date: 1/16/2020 11:45:30 -07'00'

East Commercial. The 2020 background traffic volumes assume closure of the existing 7-Eleven access to Bent Grass Meadows Drive. The 2020 background scenario also assumes Bent Grass Meadows Drive has not been extended west and no development has occurred on the parcels north of Bent Grass Meadows Drive. Through traffic on Meridian Road was assumed to grow based on two percent growth per year.

TRIP GENERATION

Estimates of the vehicle-trips generated by the development of the currently vacant parcels within Bent Grass East Commercial have been made using the nationally published trip generation rates found in *Trip Generation, 10th Edition* by the Institute of Transportation Engineers (ITE). Table 1 shows the land use assumed for each vacant parcel within Bent Grass East Commercial. There are currently no plans for the portion of Tract BB just south of Bent Grass Meadows Drive and for Filing 2A Lot 1A. It was assumed that these areas would be developed with similar uses and densities proposed for Tracts A and D. Table 1 also shows a trip generation estimate for the approved expansion of the veterinary clinic located on Lot 3B of Filing 2B.

The total number of vehicle-trips generated has been reduced to take into account the “pass-by” phenomena. A pass-by trip is made by a motorist who would already be on the adjacent roadways regardless of the proposed development, but who stops in at the site while passing by. The motorist would then continue on his or her way to a final destination in the original direction. The pass-by percentages shown on Table 1 are from the *Trip Generation Handbook - An ITE Proposed Recommended Practice, 3rd Edition*, 2017 by ITE.


Development of the currently vacant parcels within Bent Grass East Commercial (not including the approved expansion of the veterinary clinic) can be expected to generate an additional 4,595 vehicle-trips on the average weekday, with about half entering and half exiting in a 24-hour period. During the morning peak hour, which generally occurs for one hour between 6:30 and 8:30 a.m., about 212 additional vehicles would enter, and 126 additional vehicles would exit the site. During the afternoon peak hour, which generally occurs for one hour between 4:15 and 6:15 p.m., about 228 additional vehicles would enter, and 233 additional vehicles would exit the site.


TRIP DISTRIBUTION AND ASSIGNMENT


The estimated directional distribution of the site-generated traffic volumes on the adjacent roadways is an important factor in determining the site’s traffic impacts. Figure 6 shows the directional distribution estimates for the primary site-generated traffic. The estimates have been based on the following factors: the land use proposed for the site and its location, the existing and planned street and roadway system in the vicinity; and the existing/projected traffic volumes.

existing distribution?

The pass-by trips from Meridian Road were assigned based, in large part, on the magnitude and direction of the existing traffic volumes.


 Number: 1 Author: dsdrice Date: 1/16/2020 14:28:53 -07'00'
shows

 Number: 2 Author: dsdrice Date: 1/16/2020 14:29:07 -07'00'
r

 Number: 3 Author: dsdrice Date: 1/16/2020 14:27:50 -07'00'

 Number: 4 Author: dsdrice Subject: Text Box Date: 1/16/2020 14:30:03 -07'00'

existing distribution?

 Author: Kirstin Subject: Sticky Note Date: 5/11/2020 08:09:18
The text has been clarified in the updated report.

Four-Hour Vehicular Volume Traffic Signal Warrants in the 2009 *Manual on Uniform Traffic Control Devices* (MUTCD). Table 4 show the warrant evaluation. Table 4.3 shows existing condition and the projected traffic condition following buildout of the Bent Grass East Commercial development.

Based on the analysis shown in Table 4, four of the eight hours analyzed currently meet the thresholds for an Eight Hour Vehicular Volume Warrant. With the addition of traffic projected to be generated by the approved expansion of the veterinary clinic located on Lot 3B of Filing No. 2B seven of the eight hours analyzed are projected to meet the threshold. With the addition of traffic projected to be generated by development of the currently proposed land uses (TAZs 5, 6, and 7) all eight hours analyzed are projected to meet the thresholds.

Two of the eight hours analyzed currently meet the thresholds for a Four-Hour Vehicular Volume Warrant. A Four-Hour Vehicular Volume Warrant is projected to be met with the addition of traffic projected to be generated by the approved expansion of the veterinary clinic located on Lot 3B of Filing No. 2B.

Warrant 7 Analysis (Crash Experience)

The following is from the MUTCD:

Support:

01 The Crash Experience signal warrant conditions are intended for application where the severity and frequency of crashes are the principal reasons to consider installing a traffic control signal.


Standard:


02 The need for a traffic control signal shall be considered if an engineering study finds that all of the following criteria are met:


A. Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency; and


B. Five or more reported crashes, of types susceptible to correction by a traffic control signal, have occurred within a 12-month period, each crash involving personal injury or property damage apparently exceeding the applicable requirements for a reportable crash; and

C. For each of any 8 hours of an average day, the vehicles per hour (vph) given in both of the 80 percent columns of Condition A in Table 4C-1 (see Section 4C.02), or the vph in both of the 80 percent columns of Condition B in Table 4C-1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection, or the volume of pedestrian traffic is not less than 80 percent of the requirements specified in the Pedestrian Volume warrant. These major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.

 Number: 1 Author: dsdrice Date: 1/16/2020 15:49:34 -07'00'
43

 Author: Kirstin Subject: Sticky Note Date: 5/11/2020 08:10:21
The table reference has been corrected in the updated report

 Number: 2 Author: dsdrice Date: 1/16/2020 15:51:48 -07'00'
4C-1

 Author: Kirstin Subject: Sticky Note Date: 5/11/2020 08:13:41
This is a reference to table contained in the MUTCD

Disadvantages

- It would likely be difficult, if not impossible, to fit a multi-lane roundabout at this location given the limited ROW available on the east side of the intersection.
- The projected afternoon short-term level of service for northbound through movement is projected to be worse¹ than with the roundabout.
- The travel speed through the intersection compared with a signalized intersection during the signal green phase would be slower for through traffic on Meridian Road. This may adversely affect travel times along the corridor. Also, if and when signalized intersections in the Meridian Road corridor are put into coordination, a roundabout would likely disrupt coordination.


Channelized T Intersection


The channelized T type intersection allows for an intersection with generally lower overall and side-street delay than with a conventional T intersection and with fewer stops for the through traffic on the major roadway when compared to a conventional signalized T intersection. An example of a channelized T-type intersection is at the intersection of US Highway 24 and Garrett Road near Falcon (El Paso County). That particular intersection is signalized with a “directional signal,” but a channelized T at some locations can also operate as an unsignalized intersection with Stop-sign control on the minor street (Note: the analysis for this intersection indicates LOS F for the side-street left turn if not signalized). The raised median configuration would allow for “free” (no stopping) movement for the northbound through movement through the intersection. The eastbound left turn would cross the southbound lanes and into a channelized northbound left-turn acceleration lane for merging into northbound through traffic. This left-turn acceleration lane would need to be added on Meridian Road.

Figure 8 shows the level of service results for a signalized and unsignalized channelized T intersection traffic control.

Advantages

- The intersection of Meridian/Bent Grass Meadows could likely operate at a satisfactory level of service as a Stop-sign-controlled intersection for longer as an unsignalized, channelized T intersection than if it were to remain a conventional T intersection.
- Signal control would be required to maintain an acceptable level of service, the channelized T configuration would result in lower delay for through traffic especially for the northbound traffic which would operate as a free movement. The overall intersection delay is projected to be better with a channelized T intersection.

 Number: 1 Author: dsdrice Date: 1/16/2020 15:54:26 -07'00'

 Author: Kirstin Subject: Sticky Note Date: 5/11/2020 08:14:59

The text has been updated to indicate the level of service would be worse than with either a stop-sign control or signal control

- There is the potential, depending on the time of day and traffic volumes, to allow for a longer side-street signal phase due to one-way signal progression and no red phase for northbound traffic.


Disadvantages


- The channelized T configuration may only be viable until (and if) a dual eastbound left turn lane is needed and/or Meridian Road is widened to six lanes (however, either may not occur for many years).
- The channelized T configuration may be confusing for some drivers and the merging movement into ¹ southbound traffic requires a more complex movement than with a signal. However, most motorists entering the intersection from the ² east would be regular users and would quickly learn to navigate the intersection.
- A channelized T intersection would require the construction of raised channelizing medians on Meridian Road and the ongoing maintenance of those medians. This would add significant cost to the project.
- The section of Meridian Road between this intersection and the Woodmen Hills Drive/Meridian Road intersection would need to be designed to accommodate a northbound left-turn acceleration lane from Bent Grass Meadows Boulevard, a taper, and a northbound left-turn lane approaching Woodmen Hills Drive. Based on a posted speed limit of 55 mph, the El Paso County *Engineering Criteria Manual* (ECM) requires a 960-foot-long acceleration lane plus a 222-foot taper. Based on a design speed of 60 mph the ECM requires a 290-foot-long left-turn lane approaching Woodmen Hills Drive plus storage length. The current lane length is about 700 feet plus a standard-length taper. The total length of the acceleration lane, lane tapers, and existing northbound left-turn lane for Woodmen Hills would be between 2,100 feet (1,880 if a continuous lane with a shared 222' taper length). The total distance between the intersections is about 2,000 feet (centerline to centerline).
- A channelized T can be more difficult for pedestrians than a conventional signalized intersection. However, there may be ways to better accommodate pedestrians – such as adding a pedestrian-only phase for southbound traffic. More research would be needed regarding pedestrian accommodation.


VEHICLE QUEUING ANALYSIS


For Predicting Closure of 7-Eleven Access

A queuing analysis was performed using Synchro/SimTraffic for Bent Grass Meadows Drive between Meridian Road and Meridian Park Drive to determine when the existing 7-Eleven access

 Number: 1 Author: dsdrice Date: 1/16/2020 15:55:59 -07'00'
southbound

 Author: Kirstin Subject: Sticky Note Date: 5/11/2020 08:15:59
The text has been corrected to read "northbound" in the updated report

 Number: 2 Author: dsdrice Date: 1/16/2020 15:56:15 -07'00'
east

 Author: Kirstin Subject: Sticky Note Date: 5/11/2020 08:15:46
The text has been corrected to read "west" in the updated report

located between these two intersections would need to be closed. The 2020 background morning and afternoon peak-hour traffic volumes were entered into the Synchro model. The intersection of Bent Grass Meadows/Meridian was modeled as a signal-controlled intersection. The simulation was run five times. Additional traffic was added until the eastbound left-turn queue approaching Meridian Road was projected to overflow the existing turn lane, the westbound left-turn lane approaching the 7-Eleven access was projected to overflow the existing turn lane and/or the eastbound right-turn queue approaching Meridian Road blocked the 7-Eleven access. The queuing reports are attached.

When 113 entering and 63 exiting vehicles (representing approximately 50 percent development of the currently vacant parcels within Bent Grass East Commercial) were added to the projected 2020 background traffic volumes shown in Figure 5, the westbound left-turn queue approaching the 7-Eleven access is projected to exceed the existing turn lane length. The eastbound right-turn queue approaching Meridian Road is also projected to extend to the 7-Eleven access.

Buildout Condition (No 7-Eleven Access)

A queuing analysis was performed using Synchro/SimTraffic for Bent Grass Meadows Drive between Meridian Road and the proposed west site access. The 2020 total morning and afternoon peak-hour traffic volumes were entered into the Synchro model. The simulation was run five times. The queuing reports are attached.

Based on the projected 2020 total traffic volumes the projected maximum eastbound left-turn queue on Bent Grass Meadows Drive approaching Meridian Road is 184 feet. The maximum westbound left-turn queue approaching Meridian Park Drive is 77 feet. These queues could be accommodated if Bent Grass Meadows Drive were restriped with side-by-side left-turn lanes as shown in Figure 9.

The projected maximum northbound left-turn queue on Meridian Road approaching Bent Grass Meadows Drive is 165 feet. The existing northbound left-turn lane at this intersection is about 700 feet long.

CONCLUSIONS AND RECOMMENDATIONS

Trip Generation

- Development of the currently vacant parcels within Bent Grass East Commercial can be expected to generate an additional 4,595 vehicle-trips on the average weekday, with about half entering and half exiting in a 24-hour period. During the morning peak hour, which generally occurs for one hour between 6:30 and 8:30 a.m., about 212 additional vehicles would enter, and 126 additional vehicles would exit the site. During the afternoon peak hour, which generally occurs for one hour between 4:15 and 6:15 p.m., about 228 additional vehicles would enter, and 233 additional vehicles would exit the site.

Level of Service

- The eastbound left-turn movement at the stop-sign-controlled intersection of Meridian/Bent Grass Meadows is currently operating at LOS F during the morning peak hour and LOS E during the afternoon peak hour. If signalized all movements are projected to operate at LOS D or better during the peak hours based on the projected 2020 total traffic volumes, which assume full buildout of the Bent Grass East Commercial development.
- All movements at the intersection of Meridian Park/Bent Grass Meadows Drive and the proposed site access to Bent Grass Meadows Drive are projected to operate at LOS C or better as stop-sign-controlled intersections based on the projected 2020 total traffic volumes, which assume full buildout of the Bent Grass East Commercial development.

Traffic Signal Warrant Analysis

- As discussed in the Traffic Signal Warrant Analysis section above, a Four-Hour Vehicular Volume Traffic Signal Warrant is projected to be met with the addition of traffic projected to be generated by the approved expansion of the veterinary clinic located on Lot 3B of Filing No. 2B. Seven of the eight hours analyzed are projected to meet the threshold and seven of the eight hours analyzed are projected to meet the criteria for an Eight-Hour Vehicular Volume Traffic Signal Warrant. All eight hours analyzed are projected to meet the thresholds with the addition of traffic projected to be generated by the currently proposed land uses.
- **Crash Experience Warrant:** As discussed in the Traffic Signal Warrant Analysis section above, in order for a Crash Experience Warrant to be considered, three criteria need to be met. The existing number of reported crashes in the last twelve months and the vehicular volumes at the intersection of Bent Grass Meadows/Meridian meet criteria B and C. Criteria A states, "Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency." Item A would likely need to be discussed with El Paso County. This is the final remaining item before the warrant is satisfied.

Alternative Intersection Traffic Control

- Please refer to the report section above for discussion and details. Although the analysis indicates lower intersection delay and fewer stops for northbound through traffic with the signalized channelized T intersection, the conventional signalized intersection is likely a more viable solution given the added cost of a channelized T intersection and the identified need for a future eastbound dual left turn lane at this intersection.

Roadway Improvements

- Table 5 identifies the future roadway improvements that will be needed in the vicinity of the site. Figure 10 shows the location of each improvement. Table 5 also gives a recommended trigger for when each improvement will be needed.

- There is currently a 700-foot-long single northbound left-turn lane on Meridian Road approaching Bent Grass Meadows Drive. A vehicle queueing analysis indicates that this intersection could continue to operate with a single left-turn lane based on the 2020 total traffic volumes, which assume buildout of the Bent Grass East Commercial Development.
- There is currently a southbound right-turn deceleration lane on Meridian Road approaching Bent Grass Meadows Drive.
- There is currently a westbound left-turn lane on Bent Grass Meadows Drive approaching the proposed full-movement site access.

Please contact me if you have any questions or need further assistance.

Sincerely,

LSC TRANSPORTATION CONSULTANTS, INC.

By: Jeffrey C. Hodsdon, P.E., PTOE
Principal

JCH:KDF/bjwb


Enclosures: Tables 1, 3, 4, and 5
Figures 1-10
Crash Reports
Traffic Count Report
Level of Service Reports
Queuing Reports

where?


1


What is length? Is it adequate for a signalized intersection?

2


 Number: 1 Author: dsdrice Subject: Callout Date: 1/16/2020 23:35:45 -07'00'

where?

 Author: Kirstin Subject: Sticky Note Date: 5/11/2020 08:16:57
The text has been revised to clarify the location of the existing left-turn lane

 Number: 2 Author: dsdrice Subject: Callout Date: 1/16/2020 23:35:02 -07'00'

What is length? Is it adequate for a signalized intersection?

 Author: Kirstin Subject: Sticky Note Date: 5/11/2020 08:17:22
The requested information has been included in the updated report

Vet expansion?

1


Table 1 Trip Generation Estimate Bent Grass																			
Zone	Lot	Area (acres)	Floor Area Ratio	Land Use Code	Land Use Description	Trip Generation Units		Trip Generation Rates ⁽¹⁾					Total Future Trips Generated					Pass-By Trips ⁽²⁾	New External Future Trips Generated Average Weekday Traffic
						Existing	Future	Average Weekday Traffic	Morning Peak Hour		Afternoon Peak Hour		Average Weekday Traffic	Morning Peak Hour		Afternoon Peak Hour			
									In	Out	In	Out		In	Out	In	Out		
Existing/Approved Land Uses																			
1	Bent Grass East Commercial Fil. No. 1 Lot 1	1.05	0.07	---	7-Eleven	3.01 KSF ⁽³⁾	0 KSF	---	---	---	---	---	---	---	---	---	---	---	
2	Bent Grass East Commercial Fil. No. 2 Tract A	1.5	---	---	Drainage	---	---	---	---	---	---	---	---	---	---	---	---	---	
3	Bent Grass East Commercial Fil. No. 2A Lot 2A	0.70	0.12	720	Medical-Dental Office Building	3,516 KSF	0 KSF	---	---	---	---	---	---	---	---	---	---	---	
4	Bent Grass East Commercial Fil No. 2B Lot 3B	0.99	0.19	640	Animal Hospital/Veterinary Clinic	4,171 KSF	4,171 KSF	21.50	2.53	1.24	1.57	2.35	90	11	5	7	10	0%	
Currently Proposed Land Uses																			
5	Bent Grass East Commercial Fil No. 2B Tract BB - A	0.91	0.12	932	High-Turnover Sit-Down Restaurant	4.8 KSF	4.8 KSF	112.18	5.47	4.47	6.06	3.71	538	26	21	29	18	43%	
6	Bent Grass East Commercial Fil No. 2B Tract BB - B	0.49	0.22	770	Business Park	4.8 KSF	4.8 KSF	76.88	1.29	0.23	0.48	1.36	369	6	1	2	7	0%	
6	Bent Grass East Commercial Fil No. 2B Tract BB - C	0.49	0.28	770	Business Park	6.0 KSF	6.0 KSF	76.88	1.29	0.23	0.48	1.36	461	8	1	3	8	0%	
7	Bent Grass East Commercial Fil No. 2B Tract BB - D	0.68	0.20	820	Shopping Center	6.0 KSF	6.0 KSF	92.52	3.93	2.41	3.70	4.01	555	24	14	22	24	34%	
Assumed Future Land Uses																			
8	Bent Grass East Commercial Fil No. 2B Tract BB (remaining)	2.48	0.24	930	Fast Casual Restaurant	5 KSF	5 KSF	315.17	1.39	0.68	7.77	6.36	1,576	7	3	39	32	43%	
				820	Shopping Center	21 KSF	21 KSF	92.52	3.93	2.41	3.70	4.01	1,936	82	50	77	84	34%	
9	Bent Grass East Commercial Fil. No. 2A Lot 1A	1.46	0.24	820	Shopping Center	0 KSF	15 KSF ⁽³⁾	92.52	3.93	2.41	3.70	4.01	1,388	59	36	56	60	34%	
													5,435	153	90	172	173		3,679
Notes:																			
(1) Source: "Trip Generation, 10th Edition, 2017" by the Institute of Transportation Engineers (ITE)																			
(2) Source: "Trip Generation Handbook - An ITE Proposed Recommended Practice, 3rd Edition, 2017" by ITE																			
(3) KSF = thousand square feet																			
Source: LSC Transportation Consultants, Inc.																			

Provide all calculations and add Bent Grass Residential Filing 2. Separate table into existing, background, platted, and future if desired.

3


 Number: 1 Author: dsdrice Subject: Text Box Date: 1/16/2020 14:28:27 -07'00'

Vet expansion?

 Author: Kirstin Subject: Sticky Note Date: 5/11/2020 08:22:37

The trip generation projected due to expansion of the veterinary clinic is shown on the last line (Zone 4) under the "Existing/Approved Land Uses"

Table 1 has been modified in the updated report to more clearly show separate estimates for "Existing" and "Approved" land uses

 Number: 2 Author: dsdrice Date: 1/16/2020 23:14:38 -07'00'

 Number: 3 Author: dsdrice Subject: Text Box Date: 1/16/2020 23:20:03 -07'00'

Provide all calculations and add Bent Grass Residential Filing 2. Separate table into existing, background, platted, and future if desired.

 Author: Kirstin Subject: Sticky Note Date: 5/11/2020 08:22:50

The table has been updated as requested

Add items from Figure 10.

1


Table 5
Short-Term Improvements at Meridian/Bent Grass Meadows Drive
Bent Grass East Commercial Update

Improvement ⁽¹⁾		Description	Trigger	Timing
A	Signalize Meridian/Bent Grass Meadows	Remove existing stop-sign and replace with traffic signal control.	When warrant(s) are met -- 2 of the 3 conditions of the "Crash Experience" warrant are currently met. The current number of reported crashes (susceptible to correction with a signal) exceeds the threshold as do the associated traffic volume thresholds.	With opening of the approved expansion of the veterinary clinic or Once El Paso County determines that the remaining condition within the Crash Experience Warrant has been met (determines that alternatives have failed to reduce crash frequency) and determines that a signal should be installed.
B	Right-turn acceleration lane on Meridian at Bent Grass Meadows	ECM criteria indicates the acceleration lane would need to be 960 feet long plus a 222-foot taper based on the design speed of 60 mph. Note that Owl Lane is located approximately 925 feet south of Bent Grass Meadows Drive. Therefore, the lane would be a continuous acceleration/deceleration lane between Bent Grass Meadows Drive and Owl Lane.	ECM criteria has been exceeded. A deviation was previously approved waiving this requirement with the development of Bent Grass Residential Filing 1 and Bent Grass East Commercial Filing 2A. Additional development will either require the submittal and approval of a new deviation or construction of this improvement. (Notes: The installation of the traffic signal will regularly stop southbound traffic allowing eastbound right turns to enter southbound Meridian Road without an acceleration lane. The LOS analysis indicates significant improvement of the LOS with the signal. The crash data does not indicate a safety issue with the current eastbound right movement without the accel lane. Several costly improvements may be needed to build the accel lane -- including burying the overhead power lines south to Owl Place, reconstructing the ditch section along the west side of Meridian Road, and reworking the radius at Meridian Road. This intersection is similar to the Meridian/Woodmen Hills, Meridian/Stapleton, and Meridian/Londonderry intersections to the north in that [or "to the extent that"] southbound right acceleration lanes have not been added. If the County ultimately wants a raised right-turn island on this southwest corner of the Bent Grass Meadows/Meridian Road intersection in conjunction with an accel lane, this would likely need to be accomplished later with the overall widening of Bent Grass Meadows just west of Meridian Road.	Accel lane construction or a deviation -- with any development beyond the approved expansion of the veterinary clinic and expansion of parking for the dental clinic.
C	Restrict westbound left-turn at 7-Eleven access	Remove the striping for the left-turn bay at the 7-Eleven access, restripe for two sets of dual yellow lines as shown in Figure 9. If trigger for closure of westbound left-in is reached prior to the trigger for access closure, install No Left Turn signs and reflective, plastic delineators within the painted center median across the 7-Eleven access.	When westbound left-turn queue exceeds the length of the existing lane.	With 50% percent development of the remaining vacant parcels within Bent Grass East Commercial beyond the approved expansion of the veterinary clinic and expansion of parking for the dental clinic.
D	Close 7-Eleven Access	Remove the existing curb cut.	When the eastbound right-turn queue approaching Meridian Road blocks the access and/or if motorists exiting from the 7-Eleven access and turning into the eastbound left-turn lane approaching Meridian Road regularly impede/block the adjacent eastbound right-turn lane approaching Meridian Road.	With 50% percent development of the remaining vacant parcels within Bent Grass East Commercial beyond the approved expansion of the veterinary clinic and expansion of parking for the dental clinic.
E	Restripe westbound left-turn lane approaching Meridian Park	Stripe as shown in Figure 9.	With C	


Notes:

(1) See Figure 10 for the location of each recommended improvement.

Source: LSC Transportation Consultants, Inc.

 Number: 1 Author: dsdrice Subject: Text Box Date: 1/16/2020 23:18:13 -07'00'

[Add items from Figure 10.](#)

 Author: Kirstin Subject: Sticky Note Date: 5/11/2020 08:23:04
The table has been updated as requested

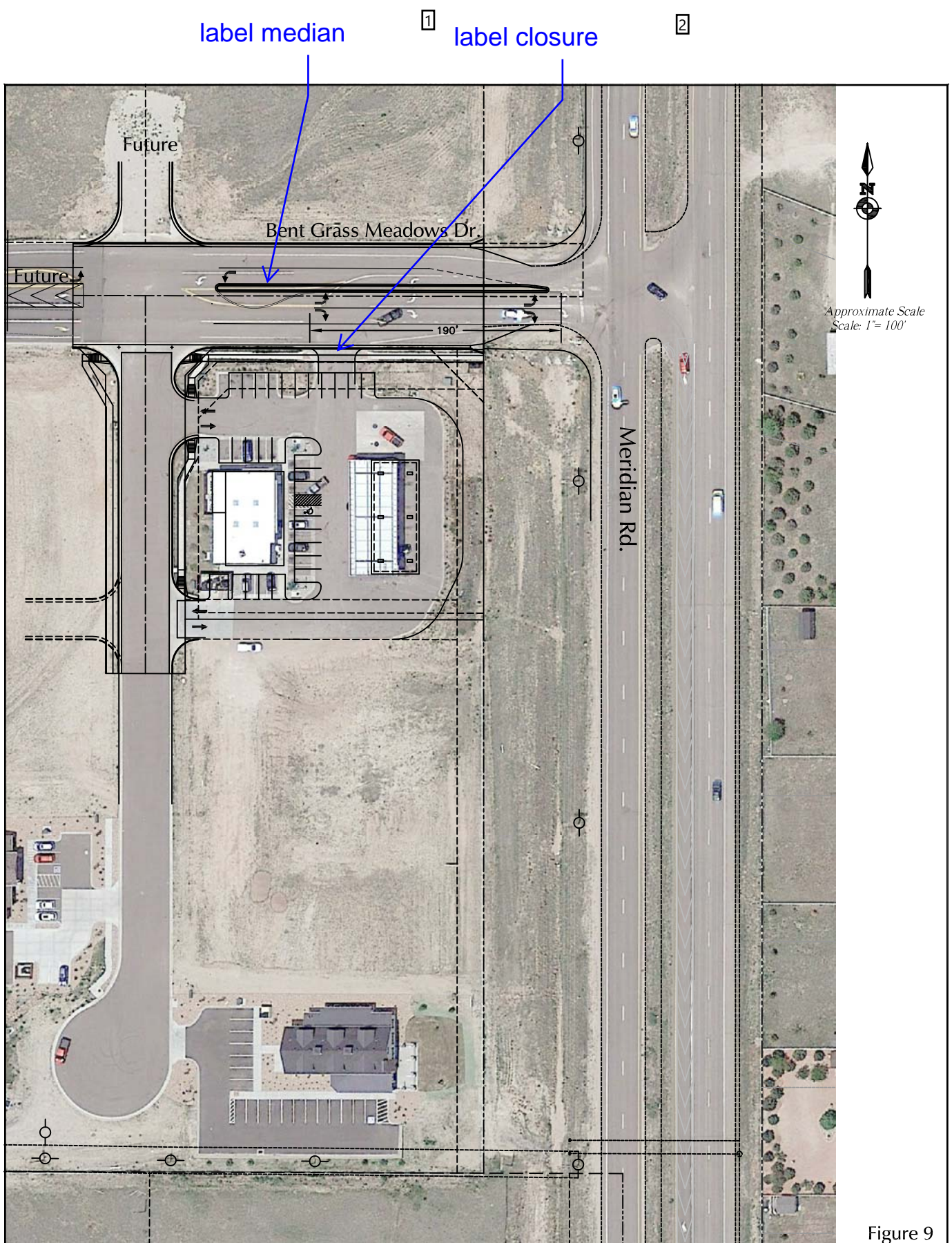




Figure 9


Recommended Short-Term Lane Geometry

Bent Grass East Commercial Update (LSC #184910)


 Number: 1 Author: dsdrice Subject: Callout Date: 1/16/2020 23:21:48 -07'00'

[label median](#)

 Author: Kirstin Subject: Sticky Note Date: 5/11/2020 08:23:16
The figure has been updated as requested

 Number: 2 Author: dsdrice Subject: Callout Date: 1/16/2020 23:22:10 -07'00'

[label closure](#)

 Author: Kirstin Subject: Sticky Note Date: 5/11/2020 08:23:19
The figure has been updated as requested

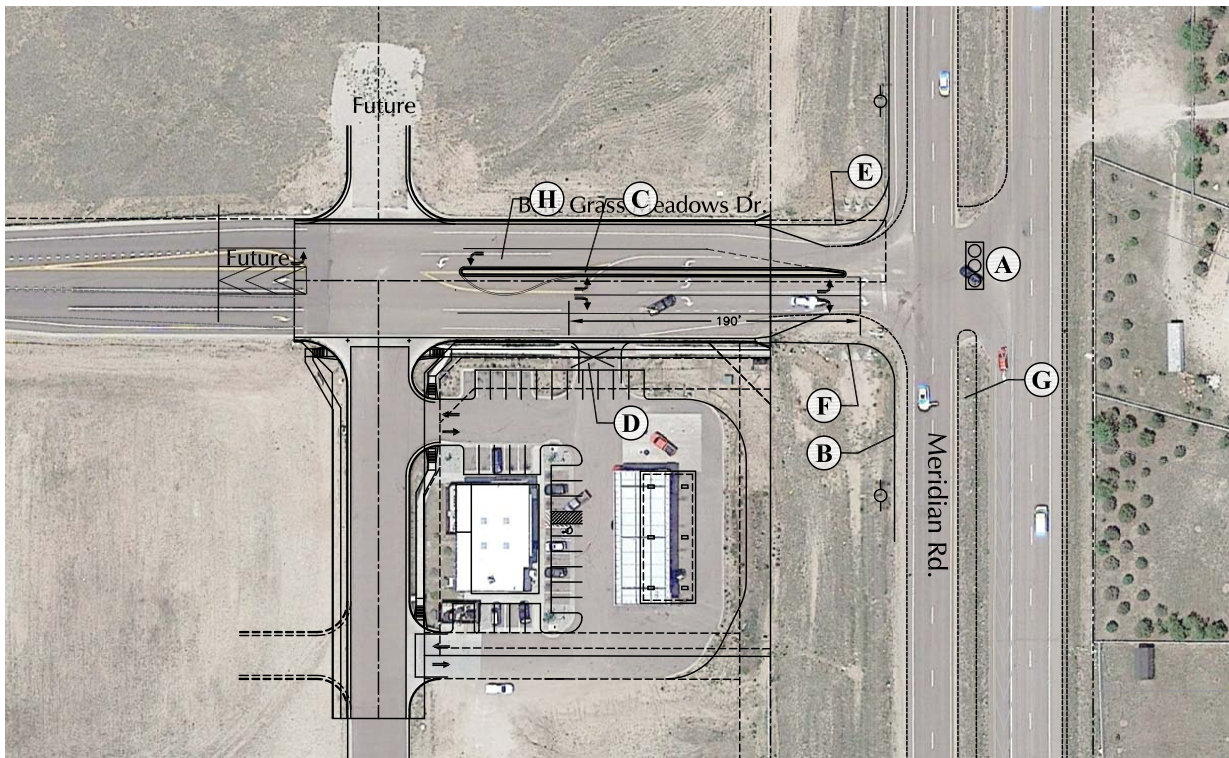



Figure 10


Future Roadway Improvements

Bent Grass East Commercial Update (LSC #184910)

1 Add items to Table 5
to match
improvements.

 Number: 1 Author: dsdrice Subject: Text Box Date: 1/16/2020 23:17:53 -07'00'

[Add items to Table 5 to match improvements.](#)

 Author: Kirstin Subject: Sticky Note Date: 5/11/2020 08:23:27
The table has been updated as requested





HCM 6th TWSC
4: BGE Commercial West Access & Bent Grass Meadows Dr

1

2020 Total Traffic
AM Peak Hour

Intersection


Int Delay, s/veh 4.1


Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	62	2	61	18	1	38
Future Vol, veh/h	62	2	61	18	1	38
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	73	92	92	91	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	85	2	66	20	1	41

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	87
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.12
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.218
Pot Cap-1 Maneuver	-	-	1509
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1509
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	5.8	8.9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	964	-	-	1509	-
HCM Lane V/C Ratio	0.044	-	-	0.044	-
HCM Control Delay (s)	8.9	-	-	7.5	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

 Number: 1 Author: dsdrice Subject: Delete Date: 1/17/2020 14:59:36 -07'00'

 Delete

HCM 6th TWSC
4: BGE Commercial West Access & Bent Grass Meadows Dr

1

2020 Total Traffic
PM Peak Hour

Intersection


Int Delay, s/veh 5.4


Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑		↑	↑	↑	
Traffic Vol, veh/h	21	2	70	41	2	67
Future Vol, veh/h	21	2	70	41	2	67
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	63	92	92	100	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	2	76	41	2	73

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	35
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.12
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.218
Pot Cap-1 Maneuver	-	-	1576
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1576
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	4.8	8.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	1024	-	-	1576	-
HCM Lane V/C Ratio	0.073	-	-	0.048	-
HCM Control Delay (s)	8.8	-	-	7.4	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.2	-

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